

2005 25 JAN 2005
(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
24 June 2004 (24.06.2004)

PCT

(10) International Publication Number
WO 2004/054013 A3

(51) International Patent Classification⁷: C01B 3/38,
3/48, 3/58

(21) International Application Number:
PCT/US2003/023759

(22) International Filing Date: 30 July 2003 (30.07.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/209,486 30 July 2002 (30.07.2002) US
60/484,086 1 July 2003 (01.07.2003) US

(71) Applicant: UOP LLC [US/US]; 25 East Algonquin Road,
Des Plaines, IL 60017-5017 (US).

(71) Applicants and

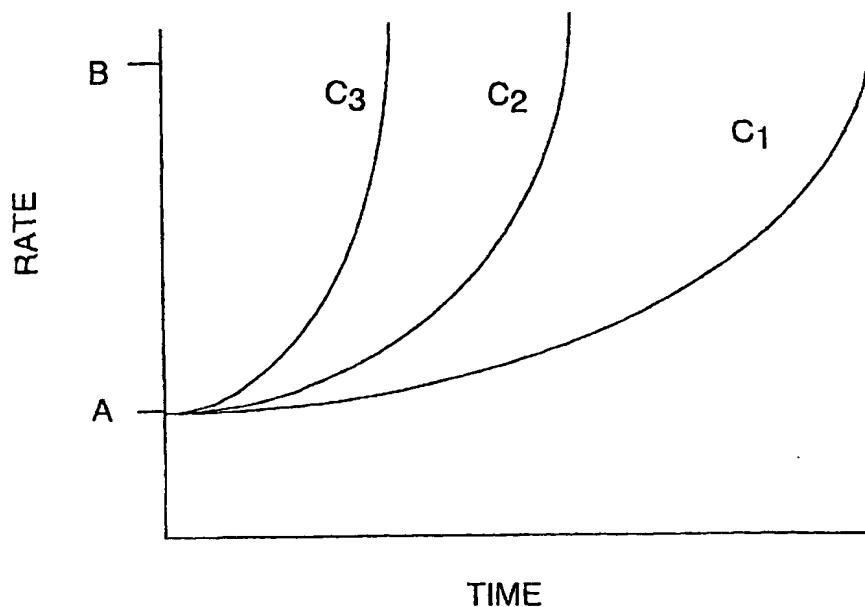
(72) Inventors: RUSSELL, Bradley, P. [US/US]; UOP LLC,
25 East Algonquin Road, Des Plaines, IL 60017-5017
(US). HARNES, John, R. [US/US]; UOP LLC, 25
East Algonquin Road, Des Plaines, IL 60017-5017 (US).
BLOMMEL, Paul, G. [US/US]; UOP LLC, 25 East
Algonquin Road, Des Plaines, IL 60017-5017 (US).
SIOU, Daniel, R. [US/US]; UOP LLC, 25 East Algo-
nquin Road, Des Plaines, IL 60017-5017 (US). ABDO,
Suheil, F. [US/US]; UOP LLC, 25 East Algonquin Road,
Des Plaines, IL 60017-5017 (US). VANDEN BUSSCHE,
Kurt, M. [BE/US]; UOP LLC, 25 East Algonquin Road,
Des Plaines, IL 60017-5017 (US). SANGER, Robert,
J. [US/US]; UOP LLC, 25 East Algonquin Road, Des
Plaines, IL 60017-5017 (US).

(74) Common Representative: TOLOMEI, John, G.; UOP
LLC, Asst. Secretary-Patent Matters, 25 East Algonquin
Road, Des Plaines, IL 60017-5017 (US).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,

[Continued on next page]

(54) Title: FEEDFORWARD CONTROL PROCESSES FOR VARIABLE OUTPUT HYDROGEN GENERATORS



(57) Abstract: Hydrogen generators and integrated hydrogen generator/fuel cells systems are operated by determining the condition of the hydrogen generator and the condition of the fuel to the hydrogen generator for selection of predetermined flow rates for each of the externally-provided raw materials. The processes of the invention can provide rapid transitions between hydrogen production rates while enabling enhanced efficiency and stability during transient operations.

WO 2004/054013 A3



LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

(84) **Designated States (regional):** ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,

(88) **Date of publication of the international search report:**
14 October 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 03/23759

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C01B3/38 C01B3/48 C01B3/58

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C01B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 267 792 B1 (YAMASHITA MASASHI ET AL) 31 July 2001 (2001-07-31) cited in the application	11-15
A	column 2, lines 13-56; figure 1 column 3, lines 6-12 column 3, line 41 - column 4, line 39 column 5, lines 10-23 column 7, lines 35-65	16-20
A	US 6 322 917 B1 (ACKER WILLIAM P) 27 November 2001 (2001-11-27) cited in the application column 3, lines 17-47 column 4, lines 1-11 column 5, lines 14-23, 49-54	16-20
A	EP 1 187 241 A (NISSAN MOTOR) 13 March 2002 (2002-03-13) the whole document	11-20

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- *G* document member of the same patent family

Date of the actual completion of the international search

29 June 2004

Date of mailing of the international search report

19/07/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Werner, H

INTERNATIONAL SEARCH REPORT

PCT/US 03/23759

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 1-10
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee; this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 1-10

Present claims 1-10 lacks clarity within the meaning of Article 6 PCT to such an extent as to render a meaningful search of the claims impossible. In claims 1-10 the determination of and controlling the feeds are undefined. How to elect predetermined feed rates is not clear. The description does not give any further aid to these problems. Consequently, the search has been carried out for those parts of the application which do appear to be clear, namely claims 11-20 in combination with the description. From claims 11-20, the ratios of the raw materials seem to be important.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 03/23759

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 6267792	B1	31-07-2001	JP	2000053403 A	22-02-2000
			CA	2277671 A1	03-02-2000
			DE	69912044 D1	20-11-2003
			DE	69912044 T2	19-05-2004
			EP	0978476 A1	09-02-2000
US 6322917	B1	27-11-2001	NONE		
EP 1187241	A	13-03-2002	JP	2002093436 A	29-03-2002
			EP	1187241 A2	13-03-2002
			US	2003027024 A1	06-02-2003